Chapter 3 | Natural & Historic Resources

INTRODUCTION 3
EXISTING CONDITIONS | NATURAL & HISTORIC RESOURCES TODAY
ENVIRONMENTAL RESOURCES 4
- Landscape & Geography 4
  - Topography 4
  - Steep Slopes 4
  - Soils 5
  - Land Cover 6
  - Forest Resources 7
- Natural Habitats & Ecosystems 8
  - Ecological Cores 8
  - Endangered & Threatened Species 11
- Water Resources ..... 11~~12~~
  - Groundwater 12
  - Surface Waters 12
  - Impacts on Water Quality ..... 12~~13~~
  - Floodplains ..... 15~~16~~
- Ambient Resources 16
  - Air Quality 16
  - Acoustic Conditions 16
  - Dark Skies 17

RURAL LANDSCAPE & COMMUNITY CHARACTER 18
- Prime Farmland 18
- Conservation Tools 19
  - Conservation Easements 19
  - Agricultural & Forestal Districts 19
  - Land Use Taxation Assessment 19
- Historic Resources ..... 19~~20~~
- Historic Preservation Tools 23

COUNTY RESILIENCE 24
Hazard Mitigation Planning 24
Central Shenandoah Regional Wildfire Protection Plan 24
Solar Energy 25
Energy Efficiency 25
GOAL, OBJECTIVES, AND STRATEGIES
Goal Statement 26
1. Protect Rockingham's Existing Environmental Resources 26
2. Preserve the Rural Landscape & Community Character 27
3. Plan for County Resilience ..... 27~~28~~

Editor's Note: This draft content chapter does not reflect final layout or formatting. Comments from the draft review will be incorporated upon receipt. Microsoft Word is used for drafts only and is not used for final layout.

INTRODUCTION

Situated in the heart of the Shenandoah Valley, Rockingham County boasts a rich variety of natural and historic resources that have shaped and defined the community and its culture. Within its rolling hills, rivers and streams, and stunning mountain views, Rockingham County is home to a booming agricultural economy, sensitive ecosystems, unique karst topography, historic battlefields, and endless beauty. This chapter inventories and discusses the existing conditions of these critical resources and presents actionable strategies to preserve their integrity and viability for future generations.

EXISTING CONDITIONS | NATURAL & HISTORIC RESOURCES TODAY

ENVIRONMENTAL RESOURCES

Landscape & Geography

Topography

Rockingham County contains four major topographic features, with elevations ranging from roughly 900 to over 4,000 feet above sea level.

- The Blue Ridge Mountains form a rugged ridge along the eastern border of the County, separating it from the Virginia Piedmont region to the east. Rockingham County's portion of this ridge is largely located within Shenandoah National Park, which provides scenic views of the surrounding area from Skyline Drive.
- Massanutten Mountain is a ridge approximately 50 miles in length, with the southern portion located in Rockingham County. Massanutten Peak is the predominant feature, enjoyed by many for its recreational opportunities and dramatic views.
- The Allegheny Mountains comprise roughly one-third of the western portion of the County, most of which is located within the George Washington and Jefferson National Forest.
- The Valley Floor includes gently rolling hills and lowlands centrally located between the surrounding mountains.

Another notable feature is Mole Hill, located in western Rockingham County between Harrisonburg and Hinton. Mole Hill was originally a conduit for molten rock from a now-extinct volcano, and is considered one of the last volcanoes to have existed in Virginia. The County's underlying rock formations are particularly susceptible to weathering and dissolution, forming underground drainage systems with caves and sinkholes. The geologic term for these areas is karst.

[See Map 3.1 | Topography]

Steep Slopes

The hills and mountains that enhance Rockingham's natural beauty are also sensitive to land disturbance and development activities. Slope refers to the angle between the earth's surface and a horizontal plane. It is expressed in percentage as measured by the change in elevation per 100 horizontal feet. A steep slope is considered to be 15% or greater. The potential for erosion increases with the steepness of a slope, influenced by the underlying soil types and soil conditions. Individual site, slope, soil type, and soil conditions will determine the level of mitigation and associated costs needed to develop

sloping areas. Moderately steep slopes of 15% to 25% may be developable with appropriate land disturbance and erosion control measures. Very steep slopes, those exceeding 25%, are best left in a natural state due to the potential for significant erosion. Development in these areas should generally be limited unless necessary and only with proper mitigation measures to prevent erosion and degradation.

With Rockingham's wide variation in terrain, areas of steep slopes occur throughout the County. Development on moderately steep slopes of 15% to 25% is possible with appropriate mitigation measures to prevent erosion, structural and septic system failures, downstream flooding, and other health and safety hazards. Clearing, grading, and land disturbance activities can be limited to only the amount necessary to minimize tree removal and soil disturbance.

While very steep slopes exceeding 25% are primarily located in the surrounding Blue Ridge and Allegheny Mountains (the majority of which are federally protected, precluding all development), slopes exceeding 25% may be found in other areas of the County, particularly around Massanutten Mountain. Development along mountainsides and ridgelines can disrupt scenic viewsheds and cause higher risks for soil slippage and landslides. County ordinances currently require erosion and sediment control and stormwater management for development. Proposed rezoning master plans must also show areas of steep slopes exceeding 25% in accordance with Zoning Ordinance Section 17-1004.04(b)(3)a.

Soils

Soils in the mountainous areas of the County were formed from underlying sandstone, shale, or greenstone bedrock. Soil depth in these areas ranges from shallow to very deep and drainage potential ranges from excessively drained to poorly drained. Subsoils are loamy or sandy. Soils in the valley between mountains were formed from weathered limestone, dolomite, and calcareous shale. These soils tend to be deep, moderately sloping, and well-drained with a clay-like subsoil. Soils on river terraces were formed from sediments carried downstream and are primarily found along the banks of the Shenandoah River's North and South Forks and related tributaries. These soils are deep, moderately level to steep, and well drained with loamy or clayey subsoil.

On-site sewage disposal systems, or septic systems, provide sewage treatment and disposal for homes or other structures that are not connected to a centralized wastewater/sewer system. The majority (roughly 70%) of the County's soils are rated as being very limited for septic drain field suitability, but an important note is that many of these soils lie in the federally protected mountains. Soils along the Valley Floor where most people live have less limitations. Soil suitability and limitations are influenced by various factors such as soil permeability, depth to the water table, existing vegetation, and flooding, which may all affect the ability of the natural soil to support septic systems. In accordance with requirements of the Virginia Department of Health, soils on a particular site should always be surveyed prior to approval of any new septic systems to ensure proper drainage and slope conditions.

Prime agricultural soils are discussed under the Prime Farmland section of this chapter.

[See Map 3.2. | Septic System Suitability]

Land Cover

The rural and agricultural character of Rockingham County is reflected in its land cover. The majority of the County's area is forested, largely concentrated in the George Washington and Jefferson National Forest and Shenandoah National Park. Additional pockets of forest occur on the valley floor throughout the County. Agricultural pastureland and cropland account for a combined 28%, making it the second-highest type of land cover. This is a significant percentage of the County's area and reflects Rockingham's statewide leadership in agricultural production. For comparison, the state average for county pastureland and cropland cover is approximately 16%. Continuing to maintain these landscapes and prevent the rapid conversion of agricultural and forestal tracts helps retain the agricultural economy, natural resources, and pastoral characteristics that contribute to Rockingham's character and quality of life.

Table 3.1 | Land Cover

Land Cover Type	Area (Acres)	Portion of Rockingham County
Forest/Tree Cover	330,775	60.6%
Pastureland	96,524	17.7%
Cropland	57,824	10.6%
Turf Grass	34,831	6.4%
Impervious Surface	20,907	3.8%
Open Water	2,171	0.4%
Harvested/Disturbed Forest	980	0.2%
Shrub/Scrub	966	0.2%
Wetlands	629	0.1%
Barren	539	0.1%

Source: Virginia Landcover Dataset 2016, Virginia Geographic Information Network (VGIN)[1]

Forest Resources

According to the Virginia Department of Forestry's (VDOF) survey *Virginia's Forests, 2016*, most of the inventoried forest tree stock consists of oak and hickory. The VDOF's Forest Conservation Value model identifies the highest priority forestland for conservation in Rockingham County. Focus is given to the highest quality, most productive, and most vulnerable lands. The model considers various environmental factors including forested blocks, forest management potential, connectivity, watershed integrity, threat of conversion, and significant forest communities to determine a conservation priority ranking of 1 (lowest) to 5 (highest). Forest conservation values for Rockingham County are shown in Map 3.3.

Maintaining tree cover contributes to natural habitats and improves local water quality. Trees have natural stormwater management qualities by slowing down and temporarily storing rainfall, thereby increasing the water storage potential of the surrounding soil and reducing runoff that can lead to localized flooding. Tree roots hold vulnerable soils in place and reduce erosion. Additionally, trees clean the air by naturally absorbing pollutants and sequestering carbon.

[1] The 2016 dataset is the most recent data available from VGIN.

Table 3.2 | Forest Resources

Resource Type	Portion of Rockingham County
Oak-Hickory	81%
Oak-Pine	5%
Other Eastern Softwoods	5%
Maple-Beech-Birch	3%
Non-stocked	2%
Loblolly-Shortleaf Pine	1%
White-Red-Jack Pine	1%
Elm-Ash-Cottonwood	1%
Exotic Softwoods	1%
Oak-Gum-Cypress	<1%

Source: Virginia's Forests, 2016, Virginia Department of Forestry[2]

[See Map 3.3 | Forest Conservation Values]

Natural Habitats & Ecosystems

Ecological Cores

Rockingham County's natural ecosystems provide important wildlife habitats that support biodiversity and environmental health. Ecological cores are defined as large, unfragmented patches of natural land with at least 100 acres of interior land cover. Cores provide habitats for a wide range of flora and fauna, as well as recreational and tourism opportunities. Over time, ecological cores may become fragmented and disconnected due to development and associated infrastructure, such as roads and utility lines, making it difficult for wildlife to traverse the landscape. Fragmentation can also make it easier for invasive species to populate interior forests. The Department of Conservation and Recreation's (DCR) Virginia Natural Landscape Assessment has identified ecological cores in Rockingham County and ranked them based on their potential for biodiversity, ecological function, and landscape conditions, as shown on Map 3.4.

[See Map 3.4 | Ecological Cores]

[2] This is the most recent publication from the Virginia Department of Forestry.

Using Green Infrastructure and Low Impact Development to Connect Wildlife Habitats

Wildlife moves both daily and seasonally to survive. However, the habitats and corridors that animals rely on can become fragmented by barriers such as housing, roads, fences, and utility infrastructure. As a result, it may be more difficult for wildlife to reach food, water, shelter, and breeding sites. Better habitat connectivity allows wildlife to migrate with the changing seasons, boosts biodiversity and resilience in degraded ecosystems, and safeguards genetic flow between populations.

Green infrastructure and low impact development incorporate both the natural environment and engineered systems to filter stormwater, enhance ecosystem values, and support ecosystem services. An ecosystem service is any positive benefit that wildlife or ecosystems provide to people, from direct benefits such as food and fuel to indirect benefits such as pollination and photosynthesis.[3]

At smaller scales, green infrastructure and low impact development methods can include native plantings, rain gardens, permeable pavement, green roofs, and rainwater harvesting systems. At the largest scale, the preservation and restoration of natural landscapes (such as forests, floodplains, and wetlands) can be achieved using green infrastructure planning.[4]

Knowing the location of unfragmented habitat resources allows for better decision-making when locating new development and utilities. Where new development is necessary, methods such as cluster developments can achieve the desired density on smaller lots, allowing larger natural areas to be preserved for the ecological network. These principles can be particularly effective in the Stone Spring Urban Development Area (UDA), where compact, clustered development can be implemented to preserve surrounding lands.

[3] U.S. National Wildlife Federation
[4] U.S. Environmental Protection Agency

Sensitive Ecosystems

Two of the most unique and significant habitats on the United States' East Coast are located in Rockingham County.

Shenandoah Valley Sinkhole Ponds are one of Virginia's most unusual and conservation-worthy ecosystems. Sinkhole ponds that are considered rare began as ancient sinkholes that filled with layers of acidic deposits, creating an impermeable liner that allowed water to collect over time. These ponded areas are characterized by fluctuating water levels throughout the year and have created unique wetlands systems with soil conditions more similar to habitats in the Coastal Plain. The wetlands and geomorphic conditions that produced them are strictly native to a narrow zone that stretches through eastern Rockingham, Augusta, and Page Counties. In Rockingham County, Deep Run Ponds Natural Area Preserve protects eight sinkhole ponds, two of which support the globally rare plant, Virginia sneezeweed. Other rare species include the black-fruited spike-rush, northern St. John's-wort, brown bog sedge, and northern bog clubmoss.

Eastern hemlock forests are native to the northeast region of the United States and throughout the Appalachian Mountains. Several notable old-growth hemlock forests exist in Virginia, including an impressive stand in the Skidmore Fork watershed in George Washington and Jefferson National Forest. Eastern hemlocks are currently facing threats from invasive species, in particular the hemlock woolly adelgid, an insect that has caused extensive mortality in many, if not most stands. The Virginia DOF actively works to protect remaining hemlock stands and control the pest population.

Endangered & Threatened Species

Rockingham County's natural ecosystems support biodiversity and native species, including those that are at-risk. Threatened and endangered flora and fauna are outlined in Table 3.3.

Table 3.3 | Threatened and Endangered Species

Common Name/Natural Community	Scientific Name	Federal Legal Status	State Legal Status
AMPHIBIANS			
Shenandoah Mountain Salamander	Plethodon virginia	Species of concern	None
ARACHNIDA (SPIDERS & PSEUDOSCORPIONS)			
A Cave Pseudoscorpion	Chitrella sp. 1	Species of concern	None
BIRDS			
Peregrine Falcon	Falco peregrinus	None	Listed threatened
BIVALVIA (MUSSELS)			
Brook Floater	Alasmidonta varicosa	None	Listed endangered
COLEOPTERA (BEETLES)			
Avernus Cave Beetle	Pseudanophthalmus avernus	Species of concern	None
Maddens Cave Beetle	Pseudanophthalmus limicola	Species of concern	None
McMullens Cave Beetle	Pseudanophthalmus sp. 13	Species of concern	None
CRUSTACEA (AMPHIPODS, ISOPODS & DECAPODS)			
Madison Cave Isopod	Antrolana lira	Listed threatened	Listed threatened
Round Hill Cave Amphipod	Stygobromus mausi	Species of concern	None
DIPLOPODA (MILLIPEDES)			
Shenandoah Mt Xystodesmid	Nannaria shenandoa	Species of concern	None
GASTROPODA (SNAILS)			
Appalachian Springsnail	Fontigens bottimeri	Species of concern	Listed endangered
INVERTEBRATE			
Rusty-patched Bumblebee	Bombus affinis	Listed endangered	Proposed endangered
A mason bee	Osmia illinoensis	Species of concern	None
LEPIDOPTERA (BUTTERFLIES & MOTHS)			
Early Hairstreak	Erora laeta	Species of concern	None
Persius Duskywing	Erynnis persius persius	Species of concern	None
MAMMALS			
Virginia Big-eared Bat	Corynorhinus townsendii virginianu	Listed endangered	Listed endangered
Northern long-eared Myotis	Myotis septentrionalis	Listed threatened	Listed threatened
REPTILES			
Wood Turtle	Glyptemys insculpta	None	Listed threatened
VASCULAR PLANTS			
Fraser Fir	Abies fraseri	Species of concern	None
Shale barren rock cress	Boechera serotina	Listed endangered	Listed threatened
Fogg's goosefoot	Chenopodium foggii	Species of concern	None
Virginia Sneezeweed	Helenium virginicum	Listed threatened	Listed endangered
White Alumroot	Heuchera alba	Species of concern	None
Sword-leaf phlox	Phlox buckleyi	Species of concern	Proposed threatened
Northeastern Bulrush	Scirpus ancistrochaetus	Listed endangered	Listed endangered
Mountain least trillium	Trillium pusillum var. monticulum	Species of concern	None

Source: Department of Conservation and Recreation, March 2023

Water Resources

Groundwater

Many Rockingham County residents rely on groundwater as their primary drinking water source, either through private individual wells or public or private community well systems. Commercial, industrial, and agricultural operations also rely heavily on groundwater. Locally, groundwater is sourced from karst aquifers of varying depths.

As noted earlier in this Chapter, karst is a landscape formed in soluble rocks like limestone and characterized by subsurface caves, sinkholes, drainage systems, and springs. The conduits found in karst terrain directly link surface water and groundwater, making karst resources susceptible to contamination from ground-level activities. Water flow and contaminants in a karst system move particularly fast compared to non-karst aquifers, so pollutants can be difficult to track as they travel underground to drinking water wells, springs, streams, and rivers. Abandoned wells, septic systems, and underground petroleum storage tanks also pose significant threats to groundwater. Since septic systems and underground tanks are hidden from view, landowners are often not aware that pollution could be occurring.

Surface Waters

While groundwater is a major source of drinking water, surface waters contribute to the drinking water supply as well, either through centralized water distribution systems or cistern systems utilizing rivers and impoundments. Rivers and lakes also provide wildlife habitats and recreational opportunities. Surface waters in Rockingham County are part of the Shenandoah and Potomac River Basins and ultimately drain to the Chesapeake Bay. Two major branches of the Shenandoah River, the North Fork and South Fork, flow northeast through Rockingham County, then converge with the main body of the Shenandoah River near Front Royal.

Generally, the northwest portion of the County is in the North Fork watershed, with the remainder in the South Fork watershed, as shown on Map 3.5. A vast system of tributary streams and creeks feeding into both Forks traverse the landscape. Lakes and ponds ranging from small farm ponds to large recreational impoundments are scattered throughout the County, including Silver Lake, Briery Branch Lake, Hone Quarry, Switzer Lake and Lake Shenandoah. With the exception of Shenandoah Valley sinkhole ponds, most of these lakes are manmade.

[See Map 3.5 | Watersheds & Waterways]

Impacts on Water Quality

Agricultural Impacts

Agriculture is a vital industry in Rockingham County, but can also be a source of groundwater and surface water quality degradation. Contamination of water sources can be due to direct livestock access to streams and rivers, improper disposal of poultry waste, or runoff from pastures and croplands. Sediment, bacteria, fertilizers, and other pollutants can be introduced to waterways,

springs, and sinkholes, which then travel downstream throughout the watershed or seep into the groundwater supply through natural karst features.

Agricultural producers in Rockingham County are aware of the importance of conservation and water quality to the long-term viability and success of their production. Additionally, producers must comply with various state agency regulations. County producers have been participating in state and federal agency programs that provide funding to incorporate best management practices to improve and prevent environmental impacts.

Implementation of agricultural best management practices, or BMPs, can help reduce negative impacts to water quality. These can include nutrient management plans, conservation tillage, cover crops, erosion control measures, stream fencing, and more that can be catered to the needs of the site and operation. The Shenandoah Valley Soil and Water Conservation District (SVSWCD) provides technical assistance and cost-share funding programs for a variety of BMPs through the Virginia Agricultural Cost Share Program (VACS Program). The VACS Program offers more than 80 conservation practices that cover the full spectrum of agricultural operations. Additionally, the U.S. Department of Agriculture's Natural Resources Conservation Service administers federal funds through the Environmental Quality Incentives Program, Regional Conservation Partnership Program, and Conservation Stewardship Program, to cover a variety of BMPs employed on land and water.

Formatted: Body Paragrah Text

In 2026 Virginia state law will mandate livestock exclusion from waterways. Toward that end, significant progress has been made by installing fencing to keep livestock out of the County's waterways. For example, from 2020 to 2023 approximately twenty-three miles of streams were fenced through various (SVSWCD) projects.

The SVSWCD has been facilitating multi-million-dollar state cost-share BMP projects including manure injection, stream exclusion, soil nitrate tests, sediment retention, loafing lot management systems, composter facilities, cover crops, sidedress nitrogen application, forested riparian buffers, permanent vegetative cover, and more. These projects have affected 57,731 acres of land in Rockingham County, while 12,150 acres are enrolled in the Stream Exclusion Continuing Conservation Initiative.

The Virginia Department of Conservation and Recreation (DCR) Nutrient Management Program addresses nutrient applications to both urban landscapes and agricultural operations, including the practice of manure spreading. Any sizable operation[5] is required to maintain a Nutrient

[5] AFOs with **300 or more animal units,** (200 mature dairy cows) utilizing liquid manure collection and storage systems are subject to the Virginia Pollution Abatement (VPA) permit program and must have a Nutrient Management Plan (NMP).

Formatted: Font: 8 pt
Formatted: Font: 8 pt, Bold
Formatted: Font: 8 pt
Formatted: Body Paragrah Text

Management Plan written by a state-certified plan writer. The DEQ conducts annual inspections of application records, nutrient profile of manure being used, and soil tests.

Development Impacts

Development Impacts

Commercial and residential development can produce pollutants (such as construction site sediment, household chemicals, vehicle fluids, lawn and garden fertilizers, and pet waste) that can be carried via stormwater runoff into surface waters and karst features. The results of these pollutants on local waterways include, but are not limited to, sediment and nutrient loading, increased bacteria, increased oxygen demand, oil and grease pollution, and the introduction of trace metals. Stormwater runoff can become excessive on properties with increased impervious surface and poor drainage, which can also lead to localized flooding outside of flood hazard areas.

Rockingham County helps manage these impacts through its erosion and sediment control ordinances, which focus on protecting waters, roads, and properties from the pollution resulting from land disturbing activities and excessive stormwater runoff volumes. For residents and businesses, the Shenandoah Valley Soil and Water Conservation District offers cost-share funding through its Virginia Conservation Assistance Program (VCAP) to install specific conservation practices, including but not limited to rainwater harvesting, conservation landscaping, rain gardens, and permeable pavement. Similar to the aforementioned VACS Program, most VCAP practices are eligible for financial incentives and cost-share funding. Virginia DCR Urban Programs staff can also help identify BMPs for stormwater management in karst terrain.

Impaired Waterways

Virginia DEQ monitors streams and rivers for pollutants, sediments, and nutrients that negatively impact water quality. When a stream or river does not meet water quality standards, Total Maximum Daily Loads (TMDLs) are developed for that water body. TMDL implementation plans identify pollution loads and create reduction goals to improve water quality – a "pollution diet" of sorts. Rockingham County currently participates in TMDL plans for Smith Creek and Long Meadow Run/Turley Creek.

Smith Creek

Flowing through the Shenandoah Valley, the Smith Creek Watershed contains 105 square miles of land, 75% of which is located in Rockingham County. The headwaters lie in Rockingham County with a small portion in the City of Harrisonburg. Major tributaries include Lacey Spring Branch, Mountain Run, and Fridley Run.

In 1996, Smith Creek was added to Virginia's Impaired Waters List due to excess sediment and bacteria, likely due to agricultural runoff and septic system failures. In 2004, in accordance with the federal Clean Water Act, Virginia DEQ specified the maximum bacteria and sediment loads that the stream can handle to meet water quality standards while also supporting a healthy and diverse aquatic population. In May 2009, a TMDL Implementation Plan and TMDL Public Document were developed to describe measures to reduce bacteria and sediment loads and to restore the stream to its original healthy state. These measures include both agricultural and urban best management practices supported by state and federal agencies and the application of improved technology such as wastewater treatment systems.

Turley Creek/Long Meadow Run

Turley Creek and Long Meadow Run, located west and east of Broadway, respectively, flow northeast and discharge into the North Fork of the Shenandoah River. In 2012, both bodies of water were identified as impaired due to excess sediment and nitrogen. Probable sources of contamination include sediments from eroding stream banks lacking vegetative cover and cattle access through the watershed. Following a series of public meetings with state and local officials, the TMDL Implementation Plan was approved by Virginia DEQ in 2016. Similar to Smith Creek, implementation of TMDL measures will include BMPs aimed at improving agricultural practices, such as livestock stream fencing, riparian buffers, and grazing land management.

Floodplains

Floodplains are low-lying areas adjacent to waterways that serve hydrologic functions and are subject to varying levels of flooding following weather events. Wetlands can also occur in these low-lying areas. The County's Floodplain Management Ordinance protects flood-risk areas by regulating and restricting

uses, activities, and development in flood-prone areas, which are shown on Map 3.6.[6] The current ordinance exceeds minimum standards for first floor elevation.

[See Map 3.6 | Floodplains]

Flood Zones in Rockingham County[7]

Zone X – Area of minimal flood hazard, usually depicted on Flood Insurance Rate Maps as above the 500-year floodplain. Zone X is the area determined to be outside the 500-year floodplain or protected by levee.

500-Year Floodplain – Areas where there is a 0.2% annual chance of flooding.

Zone A – Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas, no depths or base flood elevations are shown within these zones.

Zone AE – The base floodplain where base flood elevations are provided.

Ambient Resources

Air Quality

Air quality is an important component to environmental and public health. The Virginia Department of Environmental Quality (Virginia DEQ) monitors air quality in accordance with the Clean Air Act and National Ambient Air Quality Standards. If the air quality in a geographic area meets or is cleaner than the national standard, it is called an attainment area; areas that do not meet the national standard are called nonattainment areas. Currently, Rockingham County is designated as an attainment area. Simple measures to maintain good air quality include promoting walking and biking where practical, planting trees, recycling, and composting.

Acoustic Conditions

Noise pollution can negatively impact quality of life. While noise cannot be wholly prevented, the highest potential for impactful levels of noise related to land uses can be addressed in the best interests of the community through the Zoning Ordinance. Examples of use-based performance standards include maximum decibels, minimum setbacks, enhanced buffering adjacent to residential districts, or other measures that are acceptable to the community.

Relatively new sources of impactful ambient noise are data centers, which are large facilities that house networking equipment for digital data storage. Due to the large scale of data centers and the mechanical equipment required to operate them, high volumes of exterior noise can be generated at all hours. Noise impacts can be mitigated by guiding data centers away from residential

[6] The most current floodplain information can be found on the County's Online GIS Portal. https://rockcova.interactivegis.com/map/
[7] Federal Emergency Management Agency

areas and using sound barriers such as landscaping and fencing to dampen sound as much as possible.

Dark Skies

Rockingham residents enjoy relatively low light pollution compared to more densely developed areas. Mitigation of light pollution contributes to a peaceful atmosphere, public health, healthy wildlife patterns, and enjoyment of nighttime dark skies. The County's outdoor lighting ordinance helps prevent light pollution through lighting plan requirements and fixture standards. Continuing the practices already in place, as well as periodically reviewing ordinances to include new best practices, will help limit light pollution and protect the dark sky qualities of the natural environment.

RURAL LANDSCAPE & COMMUNITY CHARACTER

Prime Farmland

According to the *Soil Survey of Rockingham County, Virginia*, roughly 8% of the County's soils meet the U.S. Department of Agriculture's (USDA) and the Code of Virginia's definition for prime farmland. Prime farmland is identified in Map 3.7, along with farmland of statewide importance. These soils may be eligible for programs administered by the USDA's Natural Resource Conservation Service that provide cost-share funding for easements to protect significant soils from development.

The Virginia Agricultural Model builds upon prime and important farmland criteria by also factoring in current land cover and travel time between agricultural producers and consumers, resulting in a suitability factor for agricultural lands. Scores range from Class I (Low Suitability) to Class V (High Suitability). Map 3.8 shows where land may be most suitable for agriculture based upon this scoring.

Farmland Classifications in Rockingham County[8]

Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, nursery, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion. Prime farmland includes land that possesses these characteristics but is being used currently to produce livestock and timber. It does not include land already in or committed to urban development or water storage.

Important farmland is land that is of statewide or local importance for the production of food, feed, fiber, forage, nursery, oilseed, or other agricultural crops, as determined by the appropriate state agency or local government agency, and that the USDA determines should be considered as farmland.

[See Map 3.7 | Farmland Classification]

[See Map 3.8 | Virginia Agricultural Model]

[8] Code of Virginia § 3.2-205

Conservation Tools

Conservation Easements

A conservation easement is a voluntary legal agreement, between a landowner and a land trust or agency, that permanently limits future development of the land to protect its conservation values. Under a conservation easement, landowners continue to own, use, and control their land, and can sell it or pass it on to heirs. Easements allow for and encourage rural land uses, such as forest management, agriculture, hunting, and fishing, as well as protection of historically significant landscapes such as battlefields and archaeological sites. Through conservation easements, landowners may also qualify for federal, state, and local tax incentives.

[See Map 3.9 | Protected Lands]

Agricultural & Forestal Districts

To help promote conservation of agricultural and forestal lands, the County has eight approved Agricultural and Forestal Districts. Agricultural and Forestal Districts, established under § 15.2-4300 of the Code of Virginia, are rural conservation zones reserved for the production of agricultural products, timber, and the maintenance of open space land as important economic and environmental resources. Districts are voluntarily initiated by a landowner or group of landowners as a mutual undertaking with the County. By establishing a district, property owners agree not to convert their farm, forestland, and other open space lands to more intense commercial, industrial, or residential uses for a term of four to ten years. In return, the County and Commonwealth agree not to take actions or make infrastructure investments that would interfere with the protection and enhancement of the district's economic and environmental resources.

Rockingham's Agricultural & Forestal Districts

- Cross Keys
- Dry River
- Keezletown North
- Keezletown South
- Oak Grove
- Ottobine
- Spring Creek
- Western Rockingham

Land Use Taxation Assessment

Land used for agriculture or forestry operations can be assessed and taxed relative to its actual use, as opposed to its fair market value. If minimum acreages are met for certain uses (i.e. agriculture, horticulture, forestry, or open space), then the land may be eligible for use-value taxation. While this may result in less tax revenue based on lower assessments, the County can apply for reimbursement through the Virginia DOF's Forest Sustainability Fund for Local Government to help offset the decreased revenue.

Historic Resources

Rockingham County is home to a diverse inventory of historic sites with local, state, and national significance. Vernacular architecture, historic farms and

mills, and other significant sites, such as Civil War battlefields and the former African-American community of Zenda, offer a glimpse into the rich cultural heritage of the County. Over 40 properties are currently listed on the Virginia Landmarks Register (VLR) and National Register of Historic Places (NRHP), and more may have the potential to be recognized and preserved.

[See Map 3.10 | Registered Historic Sites]

Table 3.4 | Registered Historic Sites

Map ID	Property Name	Date listed on Virginia Landmarks Register	Dated Listed on National Register of Historic Places
1	Baxter House	7/17/1973	10/3/1973
2	John K. Beery Farm	7/17/1973	9/19/1973
3	Bethlehem Church	12/16/1980	6/25/1985
4	Big Run Quarry Site	9/16/1982	12/13/1985
5	Bogata	12/18/2008	3/24/2009
6	Bon Air	3/7/2007	5/2/2007
7	Breneman-Turner Mill	3/8/2006	4/20/2006
8	Bridgewater Historic District	6/19/1984	11/1/1984
9	Cave Hill Farm	9/22/2011	11/18/2011
10	George Chrisman House	9/6/2006	12/1/2006
11	Contentment	3/17/2004	5/19/2004
12	Dayton Historic District	6/19/1984	8/16/1984
13	Deering Hall	6/18/2020	8/25/2020
14	David and Catherine Driver Farm	3/7/2006	5/8/2007
15	Edom Store and Post Office	6/6/2007	7/24/2007
16	Joseph Funk House	11/19/1974	2/24/1975
17	Harnsberger Farm	10/9/1991	1/22/1992
18	Stephen Harnsberger House	1/20/1981	7/8/1982
19	Daniel Harrison House (Fort Harrison)	6/19/1973	7/24/1973
20	Haugh House	6/16/2011	8/18/2011
21	Inglewood	5/17/1983	5/30/1985
22	Kite Mansion	9/6/2006	2/13/2007
23	Kyle's Mill House	9/13/2000	3/6/2001
24	Lincoln Homestead and Cemetery	8/15/1972	12/5/1972
25	Linville Creek Bridge	11/15/1977	4/15/1978
26	Long Meadow	3/16/2005	6/1/2005
27	Longs Chapel	9/6/2006	11/15/2006

Map ID	Property Name	Date listed on Virginia Landmarks Register	Dated Listed on National Register of Historic Places
28	Mannheim	3/17/2004	5/27/2004
29	Massanetta Springs Historic District	3/16/2005	5/26/2005
30	Melrose Caverns and Harrison Farmstead	3/20/2014	5/14/2014
31	Miller-Kite House	10/17/1978	2/1/1979
32	Peter Paul House	10/16/1979	12/28/1979
33	Paul's Ottobine Mill	3/16/2017	6/12/2017
34	Jonathan Peale House	9/5/2007	11/1/2007
35	Plains Mill	3/20/2014	5/19/2014
36	Port Republic Historic District	7/18/1978	9/8/1980
37	Rife's Mill	9/15/1999	Not Listed
38	Silver Lake Historic District	4/17/2019	5/22/2019
39	Singers Glen Historic District	12/21/1976	1/20/1978
40	Sites House	10/17/1978	4/3/1979
41	Skyline Drive Historic District*	12/4/1996	4/28/1997
42	Taylor Springs	3/13/2002	6/6/2002
43	Timberville Historic District	9/20/2012	1/2/2013
44	Tunker House	3/2/1971	7/2/1971

**Also designated as a National Historic Landmark*

Cross Keys and Port Republic Battlefields

Rockingham County is home to two significant Civil War battles: The Battle of Cross Keys and the Battle of Port Republic, both decisive victories for General Thomas J. "Stonewall" Jackson's Shenandoah Valley campaign in 1862.

In early June, 1862, Maj. Gen. Thomas J. "Stonewall" Jackson, pursued by two separate Union columns, retreated up the Shenandoah Valley toward the important river crossing at Port Republic. On the morning of June 8, the division of Maj. Gen. John C. Fremont bore down on the Confederates under Maj. Gen. Richard S. Ewell near Cross Keys outside of Harrisonburg. Deploying his infantry east and west of the Port Republic Road, Frémont moved south. A feeble advance from the Union left was beaten back with heavy losses. Ewell held the high ground south of Mill Creek and resisted all of Fremont's additional attacks. With Fremont defeated, Ewell moved to assist Jackson with the defeat of another Union force at Port Republic the next day. Rebel victories over two days weakened pursuing Union troops and enabled Jackson to support Gen. Robert E. Lee outside of Richmond. – American Battlefield Trust

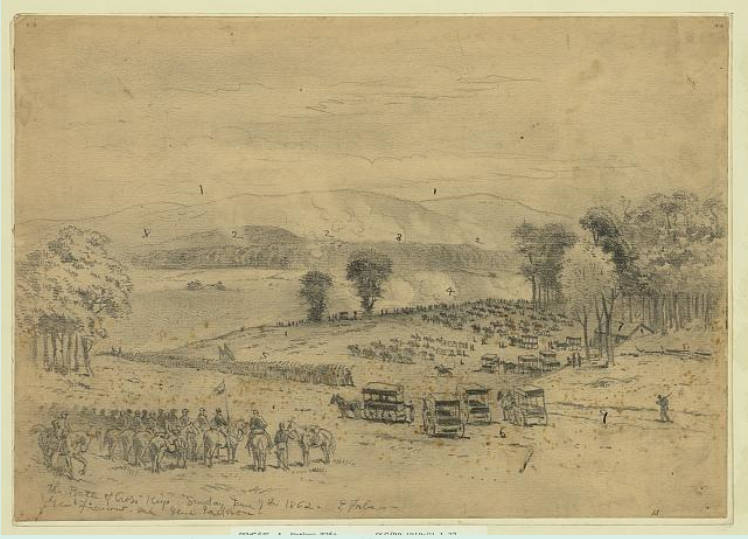

Photo Source: Library of Congress

Long's Chapel

Long's Chapel is an 1871 church and schoolhouse that served the former African-American community of Zenda, roughly located south of Lacey Spring. Originally affiliated with the Church of the United Brethren, the chapel was built under the direction of Brethren farmer Jacob Long and was used as a school during its early years. After a long period of abandonment, the chapel and adjacent cemetery were rehabilitated by the Longs Chapel Preservation Society.

Photo Source: Virginia Department of Historic Resources

Historic Preservation Tools

To continue the stewardship of the County's rich history, owners of unlisted but important sites can apply for historic register status with the Virginia Department of Historic Resources (DHR). Inclusion on state and federal historic registers opens access to various incentives, such as the Historic Rehabilitation Tax Credit program.

Working with DHR to obtain grants and incentives for rehabilitating rural village centers can maximize the return on investment in these communities. Where existing or future historic districts are established, it is possible to create new overlay zoning districts to preserve the character of districts and their resources and require compatible development. With proactive stewardship of Rockingham's historic resources, the connection to the past will remain strong for future generations.

COUNTY RESILIENCE

Rockingham County has a humid subtropical climate with cool to cold winters and hot humid summers. The growing season is approximately 175 days long, from mid-April to mid-October.

41°F	85°F	36.5"	20.1"
January Average High	July Average High	Average Annual Rainfall	Average Annual Snowfall

The County's ability to prepare for and recover quickly from natural hazards and severe weather, which helps residents and businesses continue operating with as little impact as possible. Natural disasters and other unforeseen events can directly affect a community's quality of life and daily operations. Further, people who perceive the Shenandoah Valley to be less affected by potential weather shifts may seek to relocate here from coastal areas.

Hazard Mitigation Planning

Hazard mitigation plans identify natural hazards that threaten life, property, and economic prosperity, and offer strategies to reduce the effects of these hazards on the community. Rockingham County participates in regional hazard mitigation planning through the Central Shenandoah Planning District Commission (CSPDC). The CSPDC works with the Federal Emergency Management Agency (FEMA), the Virginia Department of Emergency Management (VDEM), and local emergency managers to develop and maintain the Central Shenandoah Hazard Mitigation Plan (CSHMP). The CSHMP is updated every five years with details on how the District's localities can reduce vulnerability to natural hazards before they occur.

Central Shenandoah Regional Wildfire Protection Plan

The heavy vegetation and terrain of the Allegheny and Blue Ridge Mountains can facilitate the rapid spread of wildfire. As a companion to the Central Shenandoah Hazard Mitigation Plan, the Central Shenandoah Regional Wildfire Protection Plan (CSRWPP) assesses the risk of wildfires in the region and offers mitigation strategies to reduce vulnerabilities. A collaborative process was used to create the CSRWPP, including input from County residents and a Steering Committee made up of fire personnel and local stakeholders. The plan serves as an educational tool to raise public awareness and provide actionable steps that can be taken to reduce fire risks. The CSRWPP is reviewed and updated annually and is comprehensively reviewed every five years with the CSHMP for major updates.

Solar Energy

Solar energy facilities are an energy alternative. An adequate solar site is unshaded for at least six hours a day and can include large ground-mounted facilities or small rooftop facilities. General benefits of solar energy include bolstering the energy grid, creating manufacturing and installation jobs, reducing pollution, and lowering electric bills.

However, large ground-mounted facilities are not appropriate for all sites. Locating such facilities on green sites requires the removal of native vegetation and trees, removal of cropland or pastures, and adds impervious surface. Impacts to community character can also be detrimental where solar arrays are visible within scenic vistas. Additionally, the jobs associated with installation are temporary for individual facility sites.

Rockingham County has addressed these concerns through solar ordinance updates in 2021. Acreage caps, setbacks from property lines, vegetation minimums, restrictions on historic sites, and decommissioning plan requirements all help guarantee that the physical impacts of solar energy systems will not outweigh the environmental benefits of renewable energy. The County prefers solar energy facilities to be located on existing impervious surfaces such as parking lots and rooftops in industrial areas.

Energy Efficiency

According to the U.S. Environmental Protection Agency (EPA), the average building loses about one-third of the energy it uses. Incorporating simple and economical energy-efficient measures, such as using energy-efficient lighting, appliances, and equipment, can achieve energy and cost savings across the County's public facility portfolio. Tools such as the EPA's Energy Star Portfolio Manager can help local governments assess energy performance, set energy-savings goals, and regularly evaluate progress. The savings earned through energy-efficient best practices may be significant over a building's lifetime, and the reduction of emissions may help contribute to Rockingham's good air quality.

GOAL, OBJECTIVES, AND STRATEGIES

Goal Statement

Rockingham County's defining natural and historic resources will be stewarded for future generations by protecting the environment, preserving community character, and planning for a resilient future.

1. Protect Rockingham's Existing Environmental Resources

1.1 Minimize degradation of steep slopes.

1.1.1 Consider reviewing ordinances to add additional performance standards and/or restrictions for development on steep slopes, particularly along mountainsides and ridgelines.

1.1.2 Consider enhanced performance standards for disturbance and development on mountainous steep slopes.

1.2 Protect water quality.

1.2.1 Continue to participate in TMDL implementation plans for impaired waterways.

1.2.2 Explore additional water quality studies for potentially impaired waterways and aquifers.

1.2.3 Continue working with the Shenandoah Valley Soil and Water Conservation District, Virginia Cooperative Extension, and Natural Resources Conservation Service of the United States Department of Agriculture (NRCS) to support cost-share programs for landowners to implement best management practices appropriate for agricultural or non-agricultural properties.

1.2.4 Continue working with the Virginia Department of Health (VDH) as the agency oversees the location, density, design, and maintenance of septic systems to protect water resources.

1.2.5 Explore local, regional, and/or state organizations and programs that support groundwater protection and helps preserve the integrity of local karst aquifers, such as but not limited to DEQ's Groundwater Characterization Program, VDH's Source Water Protection Plan assistance, and the Virginia Natural Heritage Karst Program.

1.3 Protect sensitive habitat resources.

1.3.1 Periodically review landscaping ordinances and update as needed to encourage native species and related best practices.

1.3.2 Ensure that new development maintains an interconnected network of forestry resources that minimizes fragmentation.

1.3.3 Encourage green infrastructure and low impact development for new development proposals, particularly in designated growth areas.

1.3.4 Encourage public outreach efforts to increase community awareness of invasive flora and fauna and how to report them.

2. Preserve the Rural Landscape & Community Character

2.1 Preserve landscapes and open space.

2.1.1. Continue land use taxation assessments as a means to incentivize and protect agricultural and forested landscapes.

2.1.2. Continue to apply for Virginia DOF's Forest Sustainability Fund for Local Government to help offset the decreased revenue from land use taxation assessments.

2.1.3. Support participation in agricultural and forestal districts for sites that meet district requirements and in conservation easements.

2.1.4. Support opportunities to protect prime farmland for agricultural purposes in future land use decisions.

2.2 Preserve historic resources.

2.2.1. Encourage assessment of unlisted historic sites for inclusion on the Virginia Landmarks Register and/or National Register of Historic Places.

2.2.2. Continue working with local partners such as the Harrisonburg-Rockingham Historical Society to identify, and protect historic and culturally significant properties.

2.2.3. Collaborate with the Department of Historic Resources (DHR) as needed to update historic structure survey information and map surveyed properties in the County's GIS database.

3. Plan for County Resilience

3.1 Protect flood-prone areas.

3.1.1. Continue reviewing and updating the Floodplain Management Ordinance in accordance with current best practices and conditions; direct development away from flood-prone and environmentally sensitive areas unless proper mitigation measures are taken meeting the requirements and regulations of the Floodplain Management Ordinance.

3.1.2. Consider exploring participation in FEMA's Community Rating System and whether it would be of benefit to County residents.

3.2. Enhance resilience through regional planning.

3.2.1. Continue working with Central Shenandoah Planning District Commission and other regional partners to review and update the Central Shenandoah Hazard Mitigation Plan, Central Shenandoah Regional Wildfire Protection Plan, and related plans; implement Rockingham-specific strategies from these plans within the County's planning processes.

3.2.2. Continue reviewing and updating ordinances related to large- and small-scale solar energy facilities consistent with best practices to protect the interests of the community.

3.3 Improve energy efficiency.

3.3.1. Continue incorporating energy-efficient fixtures and best practices into existing, renovated, and new County-owned buildings in accordance with industry standards or programs such as Energy Star.